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**Biotechnology Videos / Animations**

Ms. Ottolini, AP Biology

**Gel Electrophoresis**

*Basic Questions:*

1. How do scientists “cut” the DNA of interest?
2. How does gel electrophoresis separate the DNA fragments on the agarose gel? (Hint: you must mention the charge of a DNA molecule)
3. How are scientists able to see the DNA fragments once they have separated on the gel?

*Application/Analysis Questions:*

1. If a scientist was trying to run a gel on a DNA sequence not recognized by any restriction enzymes, what would the resulting gel look like?
2. If a scientist accidentally placed the negative charge at the end of the gel with the wells, what would the resulting gel look like?
3. When would a scientist use gel electrophoresis ?

**Polymerase Chain Reaction (PCR)**

*Basic Questions:*

1. What is the main goal of PCR?
2. Why is the mixture DNA, Taq polymerase, primers, and free nucleotides heated to 95 degrees Celsius?
3. Why is Taq polymerase used in this process? At what temperature does Taq polymerase function most efficiently?
4. What happens to the amount of DNA with the target sequence during each PCR cycle?

*Application/Analysis Questions:*

1. When would a scientist use PCR?

**Restriction Enzyme Analysis of DNA**

*Basic Questions:*

1. *Restriction Endonuclease Video:* How are the restriction enzymes able to cut both strands of DNA?
2. *Restriction Endonuclease Video:* Why are the cut sites often “offset” from each other?
3. *Restriction Endonuclease Video:* Let’s say we wanted to anneal or attach our “sticky ends” / cut DNA back to each other. What enzyme would we use to accomplish this?
4. *RFLP Video:* Why do we say that the human genome is “polymorphic” for restriction enzyme patterns?
5. *RFLP Video:* What can cause restriction fragment length polymorphisms to occur?

*Application / Analysis Questions:*

1. How can RFLP’s be used for DNA fingerprinting?

**Bacterial Transformation**

*Basic Questions:*

1. Which bacterial genes did Cohen and Boyer choose as their genes of interest?
2. Why did the scientists add the restriction enzyme EcoRI to the plasmid DNA samples?
3. Why did the scientists add DNA ligase once they mixed the samples? What kind of plasmid were they trying to create?
4. What is the goal of “heat shocking” the *E. coli* bacteria?
5. How did the scientists isolate the plasmids with the genes conferring resistance to both antibiotics?
6. How were scientists able to determine which bacteria contained both original plasmids and which bacteria contained a recombinant plasmid with both genes?